



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/732,734	12/10/2003	Ilya Rushkin	339.7755USU	6685

7590 11/29/2004

Paul D. Greeley, Esq.
Ohlandt, Greeley, Ruggiero & Perle, L.L.P.
10th Floor
One Landmark Square
Stamford, CT 06901-2682

EXAMINER

LEE, SIN J

ART UNIT PAPER NUMBER

1752

DATE MAILED: 11/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/732,734

Applicant(s)

RUSHKIN ET AL.

Examiner

Sin J. Lee

Art Unit

1752

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-29 and 31-36 is/are rejected.
- 7) ☒ Claim(s) 13 and 30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. After reconsideration, previous 103(a) rejections of claims 13 and 30 over Yamashiki et al'208 in view of Matsuoka et al'682 and further in view of Durham et al'897 are hereby withdrawn. Although Durham teaches the equivalence of propyleneglycol monomethyl ether (Yamashiki's solvent) and 2-heptanone as his organic solvents, Durham's invention is not related to polyamic acid composition. Therefore, one of ordinary skill in the art would not be motivated to use Durham's solvent in Yamashiki's invention.

2. Due to new grounds of rejections, the following rejections are made *non-final*.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-12, 14, 17, 18-29, 31, and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashiki et al (6,455,208 B1) in view of Matsuoka et al (5,397,682).

Yamashiki teaches (col.1, lines 40-43) a colored polymer thin film composed of a polymer such as a polyimide, and in his Production Example 3, Yamashiki obtains a 20% polyamic acid solution which contains solvents of *γ*-butyrolactone and N-methyl-2-pyrrolidone by reacting compounds including 4,4'-diaminodiphenyl ether (DAE) and 4,4'-oxydiphthalic dianhydride (OPDA). The DAE is the present 4,4'-diaminodiphenyl ether of claims 3 and 5-7, and the OPDA is the present 3,3',4,4'-diphenyloxidetetra-carboxylic

acid dianhydride of claims 3, 4 (structure XV), 6, and 7. Therefore, Yamashiki also inherently teaches present polyamic acid of the formula X of present claim 2.

Although Yamashiki does not explicitly teach the use of an adhesion promoter in his invention, it is well known in the art to add an adhesion promoter to a polyimide precursor composition in order to improve an adhesion property of the polyimide coating film to a substrate as evidenced by Matsuoka et al, col.11, lines 21-40. Matsuoka includes γ -glycidoxypropylmethyldimethoxysilane (*which meets present formula IV of present claim 1*) as one of the examples for such adhesion promoting compounds. Based on Matsuoka's teaching, it would have been obvious to one of ordinary skill in the art to add an adhesion promoter such as γ -glycidoxypropylmethyldimethoxysilane into Yamashiki's polyamic solution so as to improve an adhesion property of his polyimide film to a substrate as taught by Matsuoka. Therefore, Yamashiki in view of Matsuoka would render obvious present inventions of claims 1-7, 9-11, and 14 (since Yamashiki teaches present polyamic acid of claims 2-7, it is the Examiner's position that Yamashiki's polyamic acid would inherently be soluble in aqueous tetramethylammonium hydroxide and would also inherently be resistant to a solvent used in a photosensitive composition with which the polyimide precursor composition is to be used as presently recited in claim 1).

With respect to present claim 8, in his Production Example 3, Yamashiki uses total of 1 mol of diamine compounds (DAE, PDA and SiDA) and 0.9975 mols of OPDA (a dianhydride compound). Therefore, Yamashiki in view of Matsuoka would render obvious present invention of claim 8.

With respect to present claim 12, in Production Example 3, Yamashiki uses solvents of *γ*-butyrolactone and N-methyl-2-pyrrolidone. In col.15, lines 7-14, Yamashiki teaches that an organic solvent which does not dissolve the polyimide precursor by itself, for examples, ethanol, butanol, isopropanol, methyl cellosolve, ethyl cellosolve, or propyleneglycol monomethyl ether, can be mixed with the solvent which dissolves the polyimide precursor. Therefore, it would have been obvious to one of ordinary skill in the art to use propyleneglycol monomethyl ether (which has boiling point of 118-119°C) as the other solvent in Yamashiki's Production Example 3 with a reasonable expectation of obtaining a liquid crystal display exhibiting excellent display performance. Therefore, Yamashiki in view of Matsuoka would render obvious present invention of claim 12.

With respect to present claim 17, Matsuoka teaches that the amount of the adhesion promoter is preferably 0.5-10 parts by weight per 100 parts by weight of the polyimide precursor. The range overlaps with present range of claim 17 and thus would render the present range *prima facie* obvious. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, Yamashiki in view of Matsuoka would render obvious present invention of claim 17.

In col.6, lines 26-56, Yamashiki teaches that a color paste made of his polyamic solution is coated on the substrate and then heat-dried (Preferably at 80-120°C) to form a polyimide precursor colored film, Then a positive photoresist is coated on the polyimide precursor colored film to form a photoresist coating. Then, a mask is place on

the photoresist coating, followed by irradiation with UV rays by using an exposure device. After exposure, the photoresist coating and the polyimide precursor colored film are simultaneously etched with a positive photoresist alkali developing solution. After etching, the unnecessary photoresist coating is separated. The polyimide precursor colored film is then converted to a polyimide colored film by heat treatment, preferably at 200-320°C. Therefore, Yamashiki in view of Matsuoka would render obvious present inventions of claims 18-29, 31, and 34-36.

5. Claims 15, 16, 32, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashiki et al (6,455,208 B1) in view of Matsuoka et al (5,397,682) as applied to claims 1 and 18 above, and further in view of Mahdi et al (US 2002/0100550 A1).

Yamashiki et al in view of Matsuoka et al is discussed above in Paragraph 4. As discussed above, Yamashiki in view of Matsuoka would render obvious adding an adhesion promoter to a polyimide precursor composition in order to improve an adhesion property of the polyimide coating film to a substrate.

Matsuoka includes (see col.11, lines 24-37) 3-methacryloxypropyltrimethoxysilane as one of the examples for such adhesion promoting compounds. Mahdi et al (see [0088]) teaches the equivalence of 3-methacryloxypropyltrimethoxysilane and phenylaminopropyltrimethoxysilane (*which is the present adhesion promoter of formula I of claims 15 and 32 as well as the present adhesion promoter of formula XVII of claims 16 and 33*) as adhesion-promoters. Since those two compounds were art-recognized equivalents (as adhesion-promoting

compounds) at the time the invention was made, one of ordinary skill in the art would have found it obvious to add phenylaminopropyltrimethoxysilane as the adhesion promoter in Yamashiki's polyamic acid solution with a reasonable expectation of improving an adhesion property of the polyimide coating film to a substrate. Therefore, Yamashiki in view of Matsuoka and further in view of Mahdi would render obvious present inventions of claims 15, 16, 32, and 33.

6. Claims 16 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashiki et al (6,455,208 B1) in view of Matsuoka et al (5,397,682) as applied to claims 1 and 18 above, and further in view of Nakamura et al (5,908,897).

Yamashiki et al in view of Matsuoka et al is discussed above in Paragraph 4. As discussed above, Yamashiki in view of Matsuoka would render obvious adding an adhesion promoter to a polyimide precursor composition in order to improve an adhesion property of the polyimide coating film to a substrate.

Matsuoka includes (see col.11, lines 24-37) γ -mercaptopropylmethyldimethoxysilane and γ -glycidoxypropylmethyldimethoxysilane as some of the examples for such adhesion promoting compounds. Nakamura teaches (col.5, lines 12-24) the equivalence of those compounds of Matsuoka to γ -mercaptopropyltrimethoxysilane (*present adhesion promoter of formula xx of claims 16 and 33*) and γ -glycidoxypropyltrimethoxysilane (*present adhesion promoter of formula XVII of claims 16 and 33*) as adhesion-promoters. Since those compounds were art-recognized equivalents (as adhesion-promoting compounds) at the time the invention was made, one of ordinary skill in the art would have found it obvious to add γ -

mercaptopropyltrimethoxysilane or γ -glycidoxypyltrimethoxysilane as the adhesion promoter in Yamashiki's polyamic acid solution with a reasonable expectation of improving an adhesion property of the polyimide coating film to a substrate. Therefore, Yamashiki in view of Matsuoka and further in view of Nakamura would render obvious present inventions of claims 16 and 33.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-7, 14-24, and 31-36 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 3-13 of copending Application No. 10/732,097. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

Claim 1 of App.'097 states the following;

1. A process for producing a heat resistant relief structure on a substrate, the process comprising the steps of:

- (a) providing a substrate;
- (b) in a first coating step, coating the substrate with a composition comprising a polyamic acid and gamma-butyrolactone to form a layer of polyamic acid having a thickness of at least about 0.5 μm ;
- (c) baking the layer of polyamic acid at a temperature or temperatures below 140° C.;
- (d) in a second coating step, coating a layer of a photoresist over the layer of polyamic acid to form a bilayer coating;
- (e) exposing the bilayer coating to radiation <250 nm
- (f) developing the bilayer coating with one or more aqueous tetramethyl ammonium hydroxide developers;
- (g) removing the remaining photoresist layer; and
- (h) curing the polyamic acid layer at a temperature at least about 200° C. to produce a polyimide structure

wherein the polyamic acid is soluble in aqueous tetramethyl ammonium hydroxide and insoluble in a solvent used with the photoresist.

Claim 8 of App.'097 states that the polyamic acid composition of claim 1 also contains an adhesion promoter, and Claim 9 of App.'097 lists the same adhesion promoters as those of present claim 1. Therefore, combination of claims 1, 8, 9 of App.'097 teaches present inventions of claim 1, 18, and 36.

Claim 3 (in combination with claims 1, 8, and 9) of App.'097 teaches present inventions of claims 3 and 20, and thus inherently teaches present inventions of claims 2 and 19. Claim 4 (in combination with claims 1, 8, and 9) of App.'097 teaches present inventions of claims 4 and 21. Claim 5 (in combination with claims 1, 8, and 9) of App.'097 teaches present inventions of claims 5 and 22. Claim 6 (in combination with claims 1, 8, and 9) of App.'097 teaches present inventions of claims 6 and 23. Claim 7 (in combination with claims 1, 8, and 9) of App.'097 teaches present inventions of claims 7 and 24. Claim 10 (in combination with claims 1, 8, and 9) of App.'097 teaches

present inventions of claims 14 and 31. Claim 11 (in combination with claims 1, 8, and 9) of App.'097 teaches present inventions of claims 15 and 32. Claim 12 (in combination with claims 1, 8, and 9) of App.'097 teaches present inventions of claims 16 and 33. Claim 13 (in combination with claims 1, 8, and 9) of App.'097 teaches present inventions of claims 17 and 34.

With respect to present claim 35, since the present temperature range of below 130° overlaps with the prior art's temperature range of below 140°, the prior art's range would have made present range *prima facie* obvious. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, claims 1, 8, and 9 would render obvious present invention of claim 35.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Allowable Subject Matter

9. Claims 13 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Yamashiki et al in view of Matsuoka et al do not teach or suggest the use of present solvent of claims 13 and 30.

Response to Arguments

10. Applicants argue that the Examiner's suggestion of using an adhesion promoter in Yamashiki's composition is hindsight based *solely* upon applicants' invention.

However, *even if* the Examiner's conclusion of obviousness were based on hindsight, since Matsuoka provides a motivation for using such adhesion promoter in a polyimide precursor composition, the Examiner's conclusion of obviousness would be based on a *permissible* hindsight.

Applicants argue that since Matsuoka's composition is not polyamic composition, one would have no basis for believing that Matsuoka's adhesion promoters would be successfully useful in present polyamic acid composition. However, in the absence of proof on the record that Matsuoka's adhesion promoters would not work in Yamashiki's composition, it is still the Examiner's position that one would have a *reasonable* expectation that Matsuoka's adhesion promoters would work well in Yamashiki's composition in improving an adhesion property of the polyimide coating film to a substrate because Matsuoka teaches adding adhesion promoter to a polyimide precursor composition and Yamashiki's polyamic composition is also a polyimide precursor composition.

Applicants argue that the rejection of claims 15, 16, 32, and 33 over Yamashiki in view of Matsuoka and further in view of Mahdi is erroneous in view of the data presented in Table 3 of present specification. The comparative data of Table 3 was carefully considered but was found to be unpersuasive. First of all, none of the adhesion promoting compounds listed in Matsuoka was compared. Therefore, the comparison was not made to the closest prior art (i.e., Yamashiki's polyamic acid composition combined with Matsuoka's adhesion promoters). Also, the distinction between the examples and the comparative examples are not so clear as to show

unexpected superior results (as to the stability and adhesion). That is, there are no numeric values for evaluation between examples and comparative examples. *For example*, when applicants say "stable" does that mean that it *never* becomes gelled? Or, does it become gelled eventually, and if so how long does it take to become gelled? Also when applicants say "gelled" does that mean that it turns to the gelled state immediately? Therefore, it is the Examiner's position that the comparative data fails to show unexpected superior results of present invention over that of cited prior arts.

For the reasons stated above, present rejections still stand.

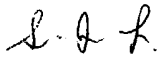
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

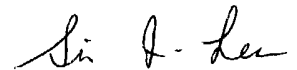
Art Unit: 1752

you have questions on access to the Private PAIR system, contact the Electronic
Business Center (EBC) at 866-217-9197 (toll-free).



S. Lee

June 4, 2004



Sin J. Lee

Patent Examiner

Technology Center 1700